THE UNDERGROUND CANALS OF BIDDEFORD

[prepared BY FRANCIS T. SPENCER]

During the first half of the 19th century, America began emerging from the colonial days' style of living. Population increased dramatically, mostly from immigrants arriving from the European continent. Cities grew larger, and small towns became big ones. These changes were bound to affect the way people lived. For example, no longer could cloth for clothing be made by hand spinning and weaving. The demand was just too great. Europe had faced the same problem somewhat earlier, and machinery to perform these tasks more efficiently had been developed. It is only natural that some of the immigrants would bring some of the "know-how" to start America on that same pathway.

But these machines were not simple devices like the spinning wheel or the hand loom. They had many moving parts which required some source of power to cause them to function.

Steam power had come into very limited usage, and electricity was somewhat of a novelty. But men had learned that moving water could be harnessed to create motion, and power and water wheels, properly designed, could supply the energy to operate things like sawmills and grist mills. One great problem still existed -- water power could not be transmitted anywhere except where the water wheel itself was located.

Some of the larger rivers in Massachusetts, Rhode Island and Connecticut had been used to operate textile mills. For example, Lowell and Lawrence were the sites of several mills, all driven by water power from the Merrimack River, which had been diverted through a network of canals extending for several miles.

An engineer named Samuel Bachelder had done most of the work developing the Lowell mills. In 1831, having heard about the possible use of the Saco River, he came to Biddeford to examine the site. The Saco is not a great river; its headwaters are ninety miles upstream, rising in the White Mountains of New Hampshire. However, there are numerous spots along its length where there are sharp and significant drops in elevation. For example, between Elm Street in Saco and lower Main Street in Biddeford, there are two waterfalls -- one of eight feet and the other of thirty-two feet, all in the space of a few yards.

Mr. Bachelder saw its potential as a source of power and in a few years arranged to have a canal system built to operate several mills.

The terrain consisted of low-lying land immediately along the river bank known as Yoe Cat Gully. The land then rose quite significantly as one looked westward toward where Lincoln Street is now located. This hill was known as Ram Cat Hill. The lowland became referred to as the Lower Division and the hilly land as the Upper Division.

The water wheels used were not the old massive wheels we

see in calendar pictures, but rather were called turbines. They were many times more efficient in generating energy than were the old wheels, which were totally unsuited for use in operating a large mill. The water was conducted through a large pipe-like tube which discharged the water above the turbine wheel. As it passed downward through the vanes of the turbine, it caused a vertical shaft to be rotated which in turn was connected through gearing or belts to the machinery to be driven. After passing through the wheel, the water then flowed by gravity back into the river.

The canal system for the Lower Division was of traditional, straightforward design, for the discharge canal ran parallel to the river, and, because the elevation of the river gradually sloped seaward, there was no problem in arranging for it to flow back into the main stream.

There were twenty wheels located under the mills of the Lower Division.

However, the Upper Division, because of the slope of the land, required a design which was quite unconventional. The problem was twofold: first, the mills were to be located so that the canals leading to them would be at right angles to the river flow; secondly, the water, once passing through the wheels, had no way to get back into the river downstream. This problem was solved by building another canal directly under the canal which transported the water to the wheels. Thus, after passing through the wheels, the water fell downward into the lower canal, which eventually joined the

spent water from the Lower Division wheels on its way back into the river. The complex engineering involved in this project can hardly be imagined, and only when one can actually see the arrangement of the canals can one appreciate the ingenuity of the engineers who designed it and the skill of the workers who built it.

For the most part, the canal system was built before the mills themselves, but as time went on and more mills were added, then some of the work had to be done directly under the existing mills. When one examines the method of construction and considers the relative crudeness of the tools then available, it almost defies imagination. The stonework all had to be quarried, shaped perfectly, and then put in place. No mortar was used, and the arches are so perfectly formed that they should last forever.

Just where the granite came from is not known. There was a large quarry on Granite Street and another on the Mountain Road in Arundel. Albert Day, the brother of the owner of the Mountain Road quarry, was an expert stonecutter, and he did much of the work of expanding the original canal system. Probably both quarries were used as a source.

Actual measurements of the canals are just about impossible to ascertain because of the hostile environment in the canals themselves. While no river water now courses through them, surface water seeps in, creating a layer of mud, and the darkness can hardly be described. Out-of-doors, even at midnight on a stormy night, one can make out the outline of

building or trees, but no light whatever is able to penetrate these deep caverns; hence, impenetrable darkness is everywhere, and even a very powerful electric light illuminates merely a small circle within its immediate vicinity.

The enclosed pictures give some idea of the method of construction and a hint of their vast size. The main canal from the lower dam is now filled with earth except where it is covered and trees are growing out of it. It is perhaps 15 or 20 feet deep and about 30 feet wide. There is a parallel canal nicknamed Panama. It and the building housing its water wheel were destroyed in a flood several years ago.

The canal serving the Upper Division passed under what was once the Saco-Lowell Shops, crossed Laconia Street underground, and formed a rather large mill pond perhaps 300 feet by 900 feet in size. Eventually, a mill building was erected over this pond, all the floors being placed on huge steel trusses bridging the pond. The canal feeding the Upper Division was a large one, about 60 feet wide and 10-15 feet deep. Branching off from the pond were the canals powering the mills running parallel to Lincoln Street. The original mills of this group have been demolished to create the West Point-Stevens parking lot. Later, these canals were extended toward the mill housing the clock tower on Lincoln Street.

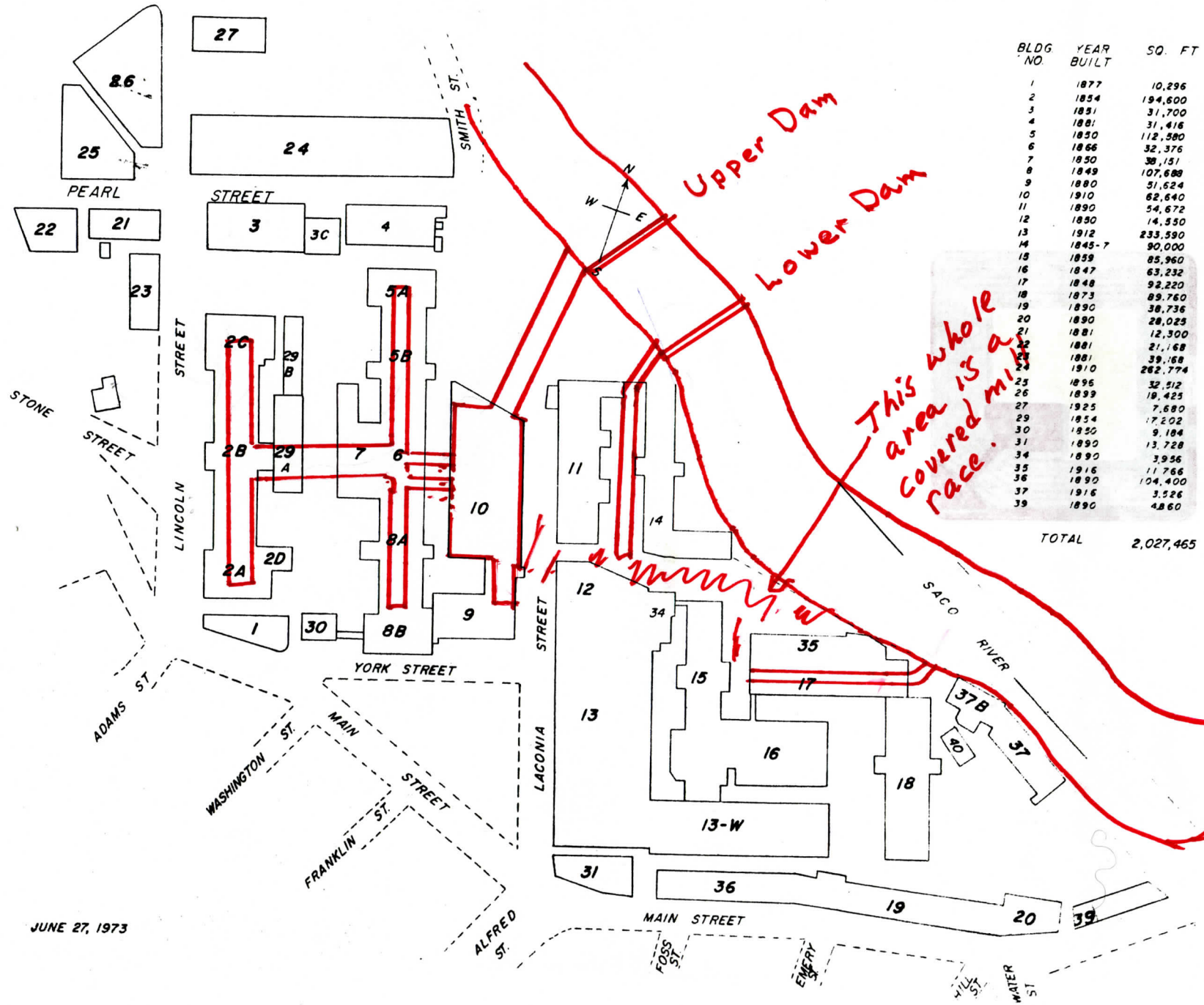
Huge grates were placed in the canals to intercept any object not suitable to pass through the wheels. Most of what was caught in the grating were pieces of wood or ice chunks, except in late spring when thousands of eels were entrapped

in the grates in such numbers as to severely reduce the flow of water. These were removed by the thousands by men using a spear-like device, some examples of which can be seen here and there in museums. About the only life forms found in the canals now is an occasional muskrat which somehow survive, but what they find to eat is a mystery.

For several years, the mills operated solely on water power, but then, as now, there were occasional droughts and the supply of water was insufficient to keep the mills operating. And so, huge steam engines were installed, to be used only when needed. These and the water wheels were cut up for scrap iron during World War II.

The enclosed map shows the large number of mills which once existed. Many have been demolished or are being used for purposes not related to manufacture. The approximate location of the canals still in existence is shown in the red outlines. Unfortunately, they show no outward trace of their presence and shall forever remain Biddeford's well-kept secret.

WEST POINT PEPPERELL BIDDEFORD, MAINE
1845 – 1973



DISPOSITION OF BUILDINGS

BLDG. NO.	YR. SOLD	SQ. FT.	PURCHASER
1.	1972	10,296	BEVERLY IND.
2.	1972	194,600	" "
3.	1972	31,700	" "
4.	1941	31,416	SACO LOWELL
14	1941	90,000	" "
15.	1971	85,960	BIDD. TEXTILE
17.	1971	92,220	" "
18.	1971	89,760	" "
21.	1941	12,300	SACO LOWELL
22	1940	21,168	WARREN
23.	1949	39,168	OSHER
24	1970	262,774	CUMMINGS
25	1940	32,512	H. CENTER
26	1940	19,425	W. THOMPSON
27	1962	7,680	S. COHEN
29	1971	8,401	BEVERLY IND.
35	1971	11,766	BIDD. TEXTILE
		1,041,146	

DEMOLISHED

5	1971	112,580
6	1971	32,376
7	1971	38,151
8	1972	107,688
31	1972	13,728
29 B	1934	8,801
39	1938	4,860
		318,184

REMAINING VELLUX MILL

9		51,624
10		62,640
11		54,672
12		14,550
13		233,590
16		63,232
19		38,736
20		28,025
34		3,956
30		9184
36		104,400
37	37B	3,526
		668,135

COLOR CODE

VELLUX MILL
SACO LOWELL
BIDDEFORD TEXTILE
WARRENS
OSHER
CUMMINGS BRO.
H. CENTER
W. THOMPSON
S. COHEN
DEMOLISHED
BEVERLY IND.

JUNE 27, 1973

BLDG NO.	YEAR BUILT	SQ. FT
1	1877	10,296
2	1854	194,600
3	1851	31,700
4	1881	31,416
5	1850	112,580
6	1866	32,376
7	1850	38,151
8	1849	107,688
9	1880	51,624
10	1910	62,640
11	1890	54,672
12	1850	14,550
13	1912	233,590
14	1845-7	90,000
15	1859	85,960
16	1847	63,232
17	1848	92,220
18	1873	89,760
19	1890	38,736
20	1890	28,025
21	1881	12,300
22	1881	21,168
23	1881	39,168
24	1910	262,774
25	1896	32,512
26	1899	19,425
27	1925	7,680
29	1854	17,202
30	1850	9,184
31	1890	13,728
34	1890	3,956
35	1916	11,766
36	1890	104,400
37	1916	3,526
39	1890	4860
TOTAL		2,027,465


WestPoint Stevens